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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/612,691	07/02/2003	Brent R. Knox-Holmes	PET-1006-US	4401
24923	7590	05/24/2005	EXAMINER	
PAUL S MADAN MADAN, MOSSMAN & SRIRAM, PC 2603 AUGUSTA, SUITE 700 HOUSTON, TX 77057-1130			JOERGER, KAITLIN S	
		ART UNIT		PAPER NUMBER
				3653

DATE MAILED: 05/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/612,691	KNOX-HOLMES ET AL.
	<b>Examiner</b>	<b>Art Unit</b>
	Kaitlin S Joerger	3653

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on Application filed 7/2/03.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-28 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-28 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 02 July 2003 is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
     Paper No(s)/Mail Date 7/2/03.
- 4) Interview Summary (PTO-413)  
     Paper No(s)/Mail Date. \_\_\_\_\_.  
 5) Notice of Informal Patent Application (PTO-152)  
 6) Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 10-12, 25, 27, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins in view of Malina.

Kalnins teaches a hydrocyclone comprising: a head section 22, having a fluid inlet, 20, and an overflow outlet, 18; a separation section, 26, having an underflow outlet, 16.

Kalnins does not teach that the liner comprises two materials, a first material in the head section with a first resistance to erosion and a second material in the separation section with a second resistance to erosion, wherein the first resistance to erosion is greater than the second resistance to erosion. He does disclose, however, that recirculation in the head section causes erosion of the outer wall of the head section, see column 6, lines 18+.

Malina teaches a hydrocyclone liner comprising two materials 44 and 46, wherein the material 46 has a higher resistance to erosion than material 44. Malina further teaches that the wear resistant materials comprise tungsten carbide, silicon carbide, ceramic, and metal, which includes stainless steel. He further teaches that a separation section liner can be made out of a relatively soft, more flexible material that would be resistant to bending and impacts, see column 5, lines 24+. It would have been obvious to one of ordinary skill in the art to include the liner of Malina comprising the two materials in the hydrocyclone of Kalnins to protect the walls of the

hydrocyclone, wherein the highly wear resistant material is placed in the head section to prevent erosion due to recirculation in the head section.

Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins in view of Malina as applied to claim 1 above, and further in view of Ellyin et al.

Neither Kalnins nor Malina teach a reinforcement layer disposed upon the separation section, but Ellyin et al. does teach such a layer. Ellyin et al. teaches a steel liner wrapped with a stack of sheets of glass fiber-reinforced epoxy. He also teaches that the fibers can be carbon fibers as well. The fibers are disposed axially within the epoxy to provide resistance to bending, see column 1, lines 14+

It would have been obvious to one of ordinary skill in the art to wrap the hydrocyclone of Kalnins in the reinforcement layer of Ellyin et al. in order to strengthen the thin separation section so that the tubular length does not bend or warp while the hydrocyclone is in a cantilevered position during installation.

Claims 2, 9, 16-22, 24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins in view of Malina as applied to claims 1 and 25 above, and further in view of Hakola.

Neither Kalnins nor Malina teach that the head section and separation section are removably affixed to one another by a flange assembly, but Hakola does, see figure 1. Hakola further teaches in figure 1 that the separation section comprises tubular portions that are interconnected by a tubular joint member.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the separable head and separation sections feature of Hakola with the hydrocyclone liner of Kalnins if one desired to be able to gain access to the sections in order to replace the liners when they wore out so that one could save money by not having to replace the entire hydrocyclone apparatus.

Claim 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins in view of Malina as applied to claim 1 above, and further in view of Gil et al.

Malina teaches that the liner can be made from metal, however, he does not teach that the liner is made from stainless steel, but Gil et al. does teach this.

It would have been obvious to one of ordinary skill in the art to construct the hydrocyclone liner of Malina from stainless steel as taught by Gil et al. as stainless steel is known to have very good resistance to both corrosion and erosion. In addition, although not specifically stated it is well known in the art that case hardening is a common way of manufacturing and treating stainless steel in order to make it as corrosive and erosive resistant as possible.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins in view of Malina in view of Hakola as applied to claims 16 and 17 above, and further in view of Ellyin et al.

Hakola does teach an external support structure for the separation section, wherein the structure is a sleeve, 68. However, he does not teach that the structure is a fiber-reinforced epoxy sleeve as Ellyin et al. does.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to construct the sleeve of Hakola from the fiber-reinforced epoxy of Ellyin et al. if one desired to be able to take advantage of the high strength to light weight ratio of the fiber-reinforced material in order to make the structure lighter and easier to handle.

Claims 3, 8, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins in view of Malina in view of as applied to claim 1 above, and further in view of applicant's disclosure.

Kalnins and Malina are silent to a reinforcement layer sprayed upon the separation section, but the application discloses such a practice as being known in the prior art, see page 12+.

It would have been obvious to spray a reinforcement layer upon the separation section as disclosed by the applicant if one desired to be able to reinforce the material and help ensure a longer life of the separation section.

Kalnins and Malina are silent to a reinforcement layer sprayed upon the separation section, but the application discloses such a practice as being known in the prior art, see page 12+.

It would have been obvious to one of ordinary skill in the art to spray a coating on the steel liner to harden the liner against erosion and help ensure a longer life of the liner.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaitlin S Joerger whose telephone number is 571-272-6938. The examiner can normally be reached on Monday - Friday 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Walsh can be reached on 571-272-6944. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ksi

  
18 May 2005

  
DONALD D. WALSH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 3600